



International Space Station Fluids & Combustion Facility

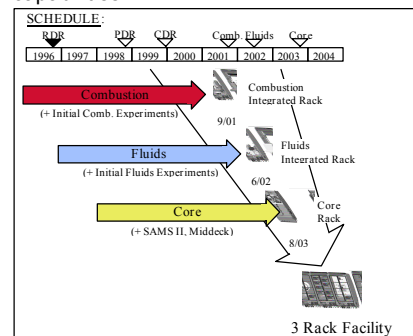


INTRODUCTION

The International Space Station United States Laboratory Module will contain the Fluids and Combustion Facility, designed and built at NASA Lewis Research Center in Cleveland, Ohio.

The Fluids & Combustion Facility (FCF) is a modular, multi-user, microgravity science facility which will occupy three powered payload instrumentation racks plus the equivalent volume of on-orbit stowage rack. Together the three racks will provide the fundamental physical and functional infrastructure necessary to perform combustion science, fluid physics, and adjunct science on-board the International Space Station.

The Facility will be launched as an incremental sequence of three separate integrated racks starting in year 2001. The first rack will be the Combustion Integrated Rack and will accommodate combustion science Principal Investigators. The second rack will be the Fluids Integrated Rack, scheduled to launch in year 2002, and will fluid physics Principal Investigators. By year 2003, the Fluids and Combustion Facility will be complete with the third rack which will add additional science experiment capabilities.

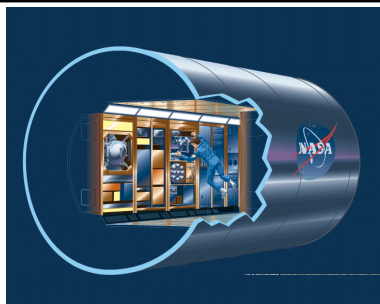


The FCF completed a Requirements Definition Review in October 1996 and is currently working on refining the concept and preliminary design of the hardware.

FCF WEB SITE

Visit the FCF Home page for additional detail:

<http://zeta.lerc.nasa.gov/cfwww/index.htm>



SCIENCE ACCOMMODATIONS

Once the FCF is complete, it will nominally accommodate an average of ten Combustion and Fluids Principal Investigator experiments per year over an expected 10 year life cycle. It is anticipated that approximately 80% of all new fluid physics and combustion science Principal Investigators that enter the microgravity research program via the NASA Research Announcement Process (NRA) will be accommodated by the FCF. The FCF is designed to increase the amount and quality of scientific data and decrease the cost of an individual experiment relative to alternate carriers.

The types of Combustion Science to be accommodated includes:

- Laminar Flames
- Reaction Kinetics
- Droplet and Spray Combustion
- Flame Spread, Fire and Fire Suppressants
- Condensed Phase Organic Fuel Consumption
- Turbulent Combustion
- Soot and Polycyclic Aromatic Hydrocarbons
- Materials Synthesis
- Detonations and Explosions

The types of Fluid Physics Experiments to be accommodated includes:

- Capillary (Isothermal)
- Colloids
- Thermo-capillarity
- Fluid Rheology, including polymers
- Electro-hydrodynamics
- Multiphase Flow
- Granular Media
- Critical Fluids
- Diffusive Phenomena

HARDWARE DESCRIPTION

Structurally, the FCF will provide augmented standard payload racks standard drawer enclosures, and rack doors. The environmental control subsystems will provide air thermal control, water thermal control, fire detection and suppression, and a gas interface. Active rack isolation will be built into all three racks along with electrical power conversion and distribution, command and data management, image processing, communication interfaces, and standard interfaces to the ISS.

SPECIFICATIONS:

Rack Upmass	500-700 kg/rack
Resupply Flights	2-4 per year
Resupply Upmass	150-300 kg/flight
On-Orbit Powered Volume	1 to 3 racks
On-Orbit Stowage (Unpowered)	0.25-1 rack
Power	1000-2000 watts
Energy	4500 to 9000 kW-hr/yr
Thermal Cooling	28-56 kg/hr
Average Downlink	1 to 5 Mbits/s
Crew Time	1 to 4 hr/wk
Standard ISS Resources	GN2, Vacuum Resource/Vent, Cooling Water

OPERATIONS & TELESCIENCE

The FCF will be tele-operated from the NASA Lewis Research Center Telescience Support Center. In concert with the Cleveland based Operations Team, the Principal Investigator's experiment will be remotely monitored and controlled from the PI's home-site.

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